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## CORRECTIONS, COMMENTS AND/OR PROCUREMENT

FOR CHARTING ERRORS, OR FOR CHANGES, ADDITIONS, RECOMMENDATIONS  
ON PROCEDURAL ASPECTS CONTACT:

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For inquiries regarding military charts, please contact [aerohelp@nga.mil](mailto:aerohelp@nga.mil)

## FOR PROCUREMENT:

For digital products, visit our website at:

[https://www.faa.gov/air\\_traffic/flight\\_info/aeronav/digital\\_products/](https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/)

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Frequently asked questions (FAQ) are answered on our website at <https://www.faa.gov/go/ais>

See the FAQs prior to contact via toll free number or email.

Request for the creation or revisions to Airport Diagrams should be in accordance with  
FAA Order 7910.4.

**GENERAL INFORMATION/INSTRUCTIONS**

**CHANGE NOTICE (CN) FOR UNITED STATES GOVERNMENT**

**TERMINAL PROCEDURES PUBLICATION**

**GENERAL:**

The United States Terminal Procedures are published in 25 Bound Volumes on a 56-day cycle. This CN is published at the mid 28-day point and contains revisions, additions and deletions to the last complete issue of the 24 volumes covering the conterminous U.S. There is no CN published for airports in the states of Alaska, Hawaii, or Pacific Islands.

**OPERATIONAL USE OF THE CHANGE NOTICE:**

During flight planning or in the case of an in-flight diversion, it is imperative that the pilot first consult this CN before making any decision as to which procedures are current at the airport of intended landing. If the airport of intended landing is not listed in the supplementary information or Index of Charts then the airport information in the basic 24 volumes has not changed.

**INDEX OF TERMINAL PROCEDURES:**

All civil airports which have revised, added or deleted procedures are listed alphabetically by city in the Index. In addition to the airport name, the Index includes the CN page number, the current procedure designation, the affected page and volume number in the last issue of the 24 conterminous US volumes and an indication whether the procedure is new, has been deleted, or replaces an existing procedure.

**EFFECTIVE DATES:**

All procedures in this CN are effective on the dates shown on the front cover unless indicated otherwise in the Index, i.e. if the procedure revision is effective on a date other than the CN publication date, this will be noted in the Index instructions by "Effective (date)". This will also be shown on the planview of the affected Chart(s).

**CONSULT CURRENT NOTAMS.**

**INOPERATIVE COMPONENTS OR VISUAL AIDS TABLE**  
**(For Civil Use Only)**

Straight-in and Sidestep landing minimums published on instrument approach procedure charts are based on full operation of all components and visual aids (see exception below for ALSF 1 & 2) associated with the particular approach chart being used. Higher minimums are required with inoperative components or visual aids as indicated below. If more than one component is inoperative, each minimum is raised to the highest minimum required by any single component that is inoperative. ILS glideslope inoperative minimums are published on the instrument approach charts as localizer minimums. This table applies to approach categories A thru D and is to be used unless amended by notes on the approach chart. Such notes apply only to the particular approach category(ies) as stated. Category E inoperative notes will be specified when published on civil charts. The inoperative table does not apply to Circling minimums. See legend page for description of components indicated below.

**Full Operation Exception:** For ALSF 1 & 2 operated as SSALR, or when the sequenced flashing lights are inoperative, there is no effect on visibility for ILS lines of minima.

**(1) ILS, PAR, LPV, GLS minima**

Inoperative Component or Visual Aid	Increase Visibility
All ALS types (except ODALS)	1/4 mile

**(2) ILS, LPV, GLS with visibility minima of RVR 1800<sup>†</sup>/2000\*/2200\***

Inoperative Component or Visual Aid	Increase Visibility
ALSF 1 & 2, MALSR, SSALR	To RVR 4000 <sup>†</sup> To RVR 4500*
TDZL or RCLS	To RVR 2400#
RVR	To 1/2 mile

#For ILS, LPV, GLS procedures with a 200 foot HAT, RVR 1800 authorized with use of FD or AP or HUD to DA. For ILS procedures with a 200 foot HAT with a restriction on autopilot usage, RVR 1800 authorized with use of FD or HUD to DA.

**(3) All Approach Types and all lines of minima other than (1) & (2) above**

Inoperative Component or Visual Aid	Increase Visibility
ALSF 1 & 2, MALSR, SSALR	1/2 mile
MALSF, MALS, SSALF, SSALS, SALSF, SALS	1/4 mile

**(4) Sidestep minima (CAT C-D)**

Inoperative Component or Visual Aid to Sidestep Runway	Increase Visibility
ALSF 1 & 2, MALSR, SSALR	1/2 mile

**(5) All Approach Types, All lines of minima**

Inoperative Component or Visual Aid	Increase Visibility
ODALS (CAT A-B)	1/4 mile
ODALS (CAT C-D)	1/8 mile

# TERMS/LANDING MINIMA DATA 20142

## IFR LANDING MINIMA

The United States Standard for Terminal Instrument Procedures (TERPS) is the approved criteria for formulating instrument approach procedures. Landing minima are established for six aircraft approach categories (ABCDE and COPTER). In the absence of COPTER MINIMA, helicopters may use the CAT A minimums of other procedures.

### LANDING MINIMA FORMAT

In this example airport elevation is 1179, and runway touchdown zone elevation is 1152.

	CATEGORY	DA		Aircraft Approach Category	HAT
		Visibility (RVR 100's of feet)	DA		
Straight-in ILS to Runway 27	S-ILS 27	1352	24		200 (200-½)
Straight-in with Glide Slope Inoperative or not used to Runway 27	S-LOC 27	1440	24	288	(300-½) 1440/50 288 (300-1)
	CIRCLING	1540-1 361 (400-1)		1640-1 461 (500-1)	1640-1½ 461 (500-½) 1740-2 561 (600-2)
		MDA	HAA	Visibility in Statute Miles	

All weather minimums in parentheses not applicable to Civil Pilots.  
Military Pilots refer to appropriate regulations.

### COPTER MINIMA ONLY

CATEGORY	COPTER		
H-176°	680-½	363	(400-½)

Copter Approach Direction Height of MDA/DA Above Landing Area (HAL) No circling minimums are provided

NOTE: The **W** symbol indicates outages of the WAAS vertical guidance may occur daily at this location due to initial system limitations. WAAS NOTAMS for vertical outages are not provided for this approach. Use LNAV minima for flight planning at these locations, whether as a destination or alternate. For flight operations at these locations, when the WAAS avionics indicate that LNAV/VNAV or LPV service is available, then vertical guidance may be used to complete the approach using the displayed level of service. Should an outage occur during the procedure, reversion to LNAV minima may be required. As the WAAS coverage is expanded, the **W** will be removed.

RNAV minimums are dependent on navigation equipment capability, as stated in the applicable AFM, AFMS, or other FAA approved document. See AIM paragraph 5-4-5, AC 90-105 and AC 90-107 for detailed requirements for each line of minima.

### COLD TEMPERATURE AIRPORTS

NOTE: A **⌘-12°C** symbol indicates a cold temperature altitude correction is required at this airport when reported temperature is at or below the published temperature. See the following Cold Temperature Error Table to make manual corrections. Advise ATC with altitude correction. Advising ATC with altitude corrections is not required in the final segment. See Aeronautical Information Manual (AIM), Chapter 7, for guidance and additional information. For a complete list, see the "Cold Temperature Airports" link under the Additional Resources heading at the bottom of the following page: [http://www.faa.gov/air\\_traffic/flight\\_info/aeronav/digital\\_products/dtpp/search/](http://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dtpp/search/)

### COLD TEMPERATURE ERROR TABLE

#### HEIGHT ABOVE AIRPORT IN FEET

REPORTED TEMP °C	200	300	400	500	600	700	800	900	1000	1500	2000	3000	4000	5000
+10	10	10	10	10	20	20	20	20	20	30	40	60	80	90
0	20	20	30	30	40	40	50	50	60	90	120	170	230	280
-10	20	30	40	50	60	70	80	90	100	150	200	290	390	490
-20	30	50	60	70	90	100	120	130	140	210	280	420	570	710
-30	40	60	80	100	120	140	150	170	190	280	380	570	760	950
-40	50	80	100	120	150	170	190	220	240	360	480	720	970	1210
-50	60	90	120	150	180	210	240	270	300	450	590	890	1190	1500

### AIRCRAFT APPROACH CATEGORIES

Aircraft approach category indicates a grouping of aircraft based on a speed of VREF, if specified, or if VREF not specified, 1.3 VSO at the maximum certificated landing weight. VREF, VSO, and the maximum certificated landing weight are those values as established for the aircraft by the certification authority of the country of registry. Helicopters are Category A aircraft. An aircraft shall fit in only one category. When necessary to operate the aircraft at an airspeed in excess of the maximum airspeed of its certified aircraft approach category, pilots should use the applicable higher category minima. For additional options and to ensure the aircraft remains within protected airspace, consult the AIM. See following category limits:

### MANEUVERING TABLE

Approach Category	A	B	C	D	E
Speed (Knots)	0-90	91-120	121-140	141-165	Abv 165

# TERMS/LANDING MINIMA DATA 25275

## CIRCLING APPROACH OBSTACLE PROTECTED AIRSPACE

The circling MDA provides vertical obstacle clearance during a circle-to-land maneuver. The circling MDA protected area extends from the threshold of each runway authorized for landing following a circle-to-land maneuver for a distance as shown in the table below. The resultant arcs are then connected tangentially to define the protected area.

## CIRCLING APPROACH MANEUVERING AIRSPACE RADIUS

Circling MDA protected areas use the radius distance shown in the following table, expressed in nautical miles (NM), dependent on aircraft approach category, and the altitude of the circling MDA, which accounts for true airspeed increase with altitude.

Circling MDA in feet MSL	Approach Category and Circling Radius (NM)				
	CAT A	CAT B	CAT C	CAT D	CAT E
1000 or less	1.3	1.7	2.7	3.6	4.5
1001-3000	1.3	1.8	2.8	3.7	4.6
3001-5000	1.3	1.8	2.9	3.8	4.8
5001-7000	1.3	1.9	3.0	4.0	5.0
7001-9000	1.4	2.0	3.2	4.2	5.3
9001 and above	1.4	2.1	3.3	4.4	5.5

Users may ignore the presence of  symbols on charts which will be removed on a day-forward basis. All circling areas within this volume have been evaluated for the circling MDA protected area radius shown in the table above.

## Comparable Values of RVR and Visibility

The following table may be used for converting RVR to ground or flight visibility. For RVR values that fall between listed values, use the next higher RVR value; do not interpolate. For example, when converting 4800 RVR, use 5000 RVR with the resultant visibility of 1 mile.

RVR (feet)	Visibility (SM)						
1200	1/4	2200	1/2	3200*	5/8	5000*	1
1600*	1/4	2400*	1/2	3500	5/8	5500	1
1800	1/2	2600	1/2	4000*	3/4	6000*	1 1/4
2000	1/2	3000	5/8	4500*	7/8		

\*Values repeated from 14 CFR 91.175 and shall be used for takeoff or landing minima.

If a visibility adjustment is required for a procedure with an RVR value, the RVR value should first be converted to visibility using this table. The visibility should then be increased by the adjustment value, and then may be converted back to the highest RVR value associated with that visibility. For example, if a procedure with 2000 RVR requires a 1/8 mile adjustment, first convert 2000 RVR to 1/2 SM. Adding 1/8 SM results in 5/8 SM, which may then be converted to 3500 RVR.

## RADAR MINIMA

RWY	GP/TCH/RPI	CAT	DA/	HAT	CEIL-VIS	CAT	DA/	HAT	CEIL-VIS
			MDA-VIS	HAA			MDA-VIS	HAA	
PAR	10	2.5°/42/1000	ABCDE	195/16	100	(100-1 1/4)	DE	560/50	463 (500-1)
	28	2.5°/48/1068	ABCDE	187/16	100	(100-1 1/4)			
ASR	10		ABC	560/40	463	(500-3 1/2)	CDE	600/60	513 (600-1 1/2)
	28		AB	600/50	513	(600-1)			
CIR	10		AB	560-1 1/4	463	(500-1 1/4)	CDE	560-1 1/2	463 (500-1 1/2)
	28		AB	600-1 1/4	503	(600-1 1/4)			

Visibility in Statute Miles

All minimums in parentheses not applicable to Civil Pilots. Military Pilots refer to appropriate regulations.

Radar Minima: 1. Minima shown are the lowest permitted by established criteria. Pilots should consult applicable directives for their category of aircraft.

2. The circling MDA and weather minima to be used are those for the runway to which the final approach is flown- not the landing runway. In the above RADAR MINIMA example, a category C aircraft flying a radar approach to runway 10, circling to land on runway 28, must use an MDA of 560 feet with weather minima of 500-1 1/2.

NOTE: Military RADAR MINIMA may be shown with communications symbology that indicates emergency frequency monitoring capability by the radar facility as follows: (E) VHF and UHF emergency frequencies monitored

(V) VHF emergency frequency (121.5) monitored

(U) UHF emergency frequency (243.0) monitored

Additionally, unmonitored frequencies which are available on request from the controlling agency may be annotated with an "x".

 Alternate Minimums not standard. Civil users refer to tabulation. USA/USN/USAF pilots refer to appropriate regulations.

 NA Alternate minimums are Not Authorized due to unmonitored facility or absence of weather reporting service.

 Airport is published in the Takeoff Minimums, (Obstacle) Departure Procedures, and Diverse Vector Area (Radar Vectors) tabulation.

## GENERAL INFORMATION

This publication is issued every 56 days and includes Standard Instrument Approach Procedures (SIAPs), Standard Instrument Departures (SIDs), Standard Terminal Arrivals (STARS), IFR Takeoff Minimums and (Obstacle) Departure Procedures (ODPs), IFR Alternate Minimums, and Radar Instrument Approach Minimums for use by civil and military aviation. The organization responsible for SIAPs, Radar Minimums, SIDs, STARS and graphic ODPs is identified in parentheses in the top margin of the procedure; e.g., (FAA), (FAA-O), (USA), (USAFA), (USN). SIAPs with the (FAA) and (FAA-O) designation are regulated under 14 CFR, Part 97. SIAPs with the (FAA-O) designation have been developed by an authorized non-FAA service provider. See 14 CFR, Part 91.175 (a) and the AIM for further details. 14 CFR, Part 91.175 (g) and the Special Notices section of the Chart Supplement contain information on civil operations at military airports.

The FAA uses an internal numbering system on all charts in the TPP. This Approach and Landing (AL) number is located on the top center margin of the chart followed by the organization responsible for the procedure in parentheses, e.g., AL-18 (FAA), AL-11919 (FAA-O). Military procedures do not show AL number, but do show the appropriate authority for the procedure, e.g., (USAF).

CHART CURRENCY INFORMATION

Date of Latest Revision	09365
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The Date of Latest Revision identifies the Julian date the chart was added or last revised for any reason. The first two digits indicate the year, the last three digits indicate the day of the year (001 to 365/6) in which the latest revision of any kind has been made to the chart.

FAA Procedure Amendment Number	→	Orig 31DEC09	←	Procedure Amendment Effective Date
	→	Amdt 2B 12MAR09	←	

The FAA Procedure Amendment Number represents the most current amendment of a given procedure. The Procedure Amendment Effective Date represents the AIRAC cycle date on which the procedure amendment was incorporated into the chart. Updates to the amendment number & effective date represent procedural/criteria revisions to the charted procedure, e.g., course, fix, altitude, minima, etc. On Departure Procedures and Standard Terminal Arrivals, procedural revisions to the current chart are indicated by an upnumber to the procedure title with the procedure amendment effective date following. On Radar Minima, Takeoff Minimums and (Obstacle) Departure Procedures and Diverse Vector Areas, the FAA Procedure Amendment Number, Procedure Effective Date, and the Julian Date of Last Revision will be shown on the same line, e.g., AMDT 2 10DEC15 (15344).

MISCELLANEOUS

★ Indicates a non-continuously operating facility, see Chart Supplement.

For Civil (FAA) and Military (DoD) instrument procedures, "RADAR REQUIRED" in the planview or the pilot briefing strip of the chart indicates that ATC radar must be available to assist the pilot when transitioning from the en route environment. In the event ATC radar must be available for a specific portion(s) of the procedure, the portion(s) will be specified in the pilot briefing strip with the statement "RADAR required".

Distances are in nautical miles (except visibility in statute miles and Runway Visual Range in hundreds of feet). Runway dimensions are in feet. Elevations are in feet, Mean Sea Level (MSL). Ceilings are in feet above airport elevation. Radials/bearings/headings/courses are magnetic. Horizontal Datum: Unless otherwise noted on the chart, all coordinates are referenced to North American Datum 1983 (NAD 83), which for charting purposes is considered equivalent to World Geodetic System 1984 (WGS 84).

Terrain is scaled within the neat lines (planview boundaries) and does not accurately underlie not-to-scale distance depictions or symbols.

STANDARD TERMINAL ARRIVALS AND DEPARTURE PROCEDURES

The use of the associated codified STAR/DP and transition identifiers are requested of users when filing flight plans online. It must be noted that when filing a STAR/DP with a transition, the first three coded characters of the STAR and the last three coded characters of the DP are replaced by the transition code. Examples: ACTON SIX ARRIVAL, file (AQN.AQN6); ACTON SIX ARRIVAL, EDNAS TRANSITION, file (EDNAS.AQN6). FREEHOLD THREE DEPARTURE, file (FREH3.RBV), FREEHOLD THREE DEPARTURE, ELWOOD CITY TRANSITION, file (FREH3.EWC).

PROCEDURE PBN/EQUIPMENT REQUIREMENTS

Users will begin to see Performance-Based Navigation (PBN) Requirements and Equipment Requirements on Instrument Approach Procedures (IAPs), RNAV STARs and RNAV DPs prominently displayed in separate, standardized notes boxes. For procedures with PBN elements, the PBN box will contain the procedure's navigation specification(s); and, if required: specific sensors or infrastructure needed for the navigation solution; any additional or advanced functional requirements; the minimum Required Navigation Performance (RNP) value and any amplifying remarks. Items listed in this PBN box are REQUIRED for the procedure's PBN elements. The Equipment Requirements Box will list non-PBN requirements. On charts with both PBN elements and equipment requirements, the PBN requirements box will be listed first. The publication of these notes will continue incrementally until all charts have been amended to comply with the new standard.

IAP PBN/Equipment Requirements Notes Box

PBN Requirements Box	From WINRZ, UBGE: RNAV-1 GPS, RNAV-1 GPS from MAP to YARKU.
Equipment Requirements Box	DME required for LOC only.
Standard Procedure Notes Box	<p>▼ Circling to Rwy 25 NA at night. #For inop MALSR increase S-ILS 16R all cats visibility to 2½ SM.</p>

RNAV STAR and DP PBN/Equipment Requirements Notes Box

PBN Requirements Box	RNAV 1 - DME/DME/IRU or GPS
Equipment Requirements Box	RADAR required

PILOT CONTROLLED AIRPORT LIGHTING SYSTEMS

Reference the Chart Supplement for detailed information on pilot controlled lighting (PCL) systems.

Available FAA standard approach lighting systems are charted as a negative symbol to indicate pilot controlled lighting, e.g., .

Available airport lighting systems that are charted as notes, e.g. REIL, MIRL, are shown with a negative "0" symbol beside the name to indicate pilot controlled lighting.

To activate lights, use frequency indicated in the communications section of the chart with a .

KEY MIKE	FUNCTION
7 times within 5 seconds	Highest intensity available
5 times within 5 seconds	Medium or lower intensity (Lower REIL or REIL-off)
3 times within 5 seconds	Lowest intensity available (Lower REIL or REIL-off)

# ABBREVIATIONS 25107

AAF.....	Army Air Field	D-ATIS.....	Digital-Automatic Terminal Information Service
AAUP.....	Attention All Users Page	DA.....	Decision Altitude
ADF.....	Automatic Direction Finder	DEP.....	Departure
ADIZ.....	Air Defense Identification Zone	DEP CON.....	Departure Control
AFAUX.....	Air Force Auxiliary	DER.....	Departure End of Runway
AFB.....	Air Force Base	DH.....	Decision Height
AFRC.....	Armed Forces Reserve Center/Air Force Reserve Command	DME.....	Distance Measuring Equipment
AGL.....	Above Ground Level	DP.....	Departure Procedure
AFHP.....	Air Force Heliport	DTHR.....	Displaced Runway Threshold
AFIS.....	Automatic Flight Information Service	DVA.....	Diverse Vector Area
AHP.....	Army Heliport	ELEV.....	Elevation
ALF.....	Auxiliary Landing Field	EMAS.....	Engineered Material Arresting System
ALS.....	Approach Light System	EXEC.....	Executive
ALSF.....	Approach Light System with Sequenced Flashing Lights	FAF.....	Final Approach Fix
ANGB.....	Air National Guard Base	FD.....	Flight Director System
ANGS.....	Air National Guard Station	FL.....	Flight Level
Ant.....	Antenna	FLD.....	Field
AOB.....	At or Below	FM.....	Fan Marker
AP.....	Autopilot System	FMS.....	Flight Management System
APCH.....	Approach	GBAS.....	Ground Based Augmentation System
APP CON.....	Approach Control	GCA.....	Ground Control Approach
AR.....	Authorization Required	GCO.....	Ground Communication Outlet
ARB.....	Air Reserve Base	GLS.....	Ground Based Augmentation System
ARPT.....	Airport	GP.....	Landing System
ARR.....	Arrival	GPS.....	Glidepath
AS.....	Air Station	GS.....	Global Positioning System
ASOS.....	Automated Surface Observing System	HAA.....	Glide Slope
ASR.....	Airport Surveillance RADAR	HAL.....	Height Above Airport
ASSC.....	Airport Surface Surveillance Systems	HAT.....	Height Above Landing
ATC.....	Air Traffic Control	HATH.....	Height Above Touchdown
ATCT.....	Airport Traffic Control Tower	HCH.....	Height Above Threshold
ATIS.....	Automatic Terminal Information Service	hdg.....	Glidepath
AUNICOM.....	Automated UNICOM	HIRL.....	Landing System
AWOS.....	Automated Weather Observing System	HUD.....	Glidepath
Baro-VNAV.....	Barometric Vertical Navigation	IAF.....	Global Positioning System
BC.....	Back Course	IAP.....	Height Above Threshold
brg.....	Bearing	ICAO.....	Height Above Touchdown
CAPT.....	Captain	IF.....	Height Above Threshold
CAT.....	Category	IFR.....	Height Above Threshold
CCW.....	Counterclockwise	ILS.....	Height Above Threshold
CDI.....	Course Deviation Indicator	IM.....	Height Above Threshold
CGAS.....	Coast Guard Air Station	INC.....	Height Above Threshold
Chan.....	Channel	Inop.....	Height Above Threshold
CIR.....	Circling	INT.....	Height Above Threshold
CL.....	Centerline Lighting System	INTCNTL.....	Height Above Threshold
CLNC DEL.....	Clearance Delivery	INTL.....	Height Above Threshold
CNF.....	Computer Navigation Fix	JNGB.....	Height Above Threshold
CPDLC.....	Controller Pilot Data Link Communications	JRB.....	Height Above Threshold
CTAF.....	Common Traffic Advisory	K.....	Joint National Guard Base
CW.....	Frequency	KIAS.....	Joint Reserve Base
	Clockwise	LAAS.....	Knots
			Knots Indicated Airspeed
			Local Area Augmentation System

# ABBREVIATIONS 25107

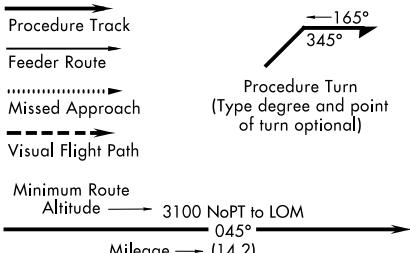
LDA.....	Localizer Type Directional Aid	OPSPEC.....	Operations Specification
Ldg.....	Landing	PAR.....	Precision Approach Radar
LIRL.....	Low Intensity Runway Lights	PDC.....	Pre-Departure Clearance
LNAV.....	Lateral Navigation	PRM.....	Precision Runway Monitor
LOA.....	Letter of Agreement/ Authorization	Pvt.....	Private
LOC.....	Localizer	R.....	Radial
LOM.....	Locator Outer Marker	RA.....	Radio Altimeter setting height
LP.....	Localizer Performance	RAIL.....	Runway Alignment Indicator
LPV.....	Localizer Performance with Vertical Guidance	RCLS.....	Lights
LR.....	Lead Radial	REIL.....	Runway Centerline Light System
LRRS.....	Long Range RADAR Station	RF.....	Runway End Identifier Lights
MAA.....	Maximum Authorized Altitude	RGNL.....	Radius to Fix
MALS.....	Medium Intensity Approach Lighting System	RLLS.....	Regional
MALSF.....	Medium Approach Lighting System with Sequenced Flashers	RNAV.....	Runway Lead-in Light System
MALSR.....	Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights	RNP.....	Area Navigation
MAP.....	Missed Approach Point	RPI.....	Required Navigation Performance
MCAF.....	Marine Corps Air Facility	RVR.....	Runway Point of Interception)
MCAFL.....	Marine Corps Auxiliary Landing Field	RWY.....	Runway Visual Range
MCAS.....	Marine Corps Air Station	S.....	Runway
MCB.....	Marine Corps Base	SALS.....	Straight-in
MCOLF.....	Marine Corps Outlying Field	SALSF.....	Simplified Short Approach Light System
MDA.....	Minimum Descent Altitude	SDF.....	Short Approach Lighting System
MEA.....	Minimum Enroute Altitude	SFB.....	System with Sequenced Flashing Lights
MEML.....	Memorial	SID.....	Simplified Directional Facility
METRO.....	Metropolitan	SM.....	Space Force Base
MIRL.....	Medium Intensity Runway Lights	SR-SS.....	Standard Instrument Departure
MM.....	Middle Marker	SSALF.....	Statute Mile
MOCA.....	Minimum Obstruction Clearance Altitude	SSALR.....	Sunrise-Sunset
MRA.....	Minimum Reception Altitude	SSALS.....	Short Approach Lighting System with Sequenced Flashing Lights
MSL.....	Mean Sea Level	ST.....	Simplified Short Approach Light System with Runway Alignment Indicator Lights
MSPEC.....	Management Specification	STE.....	Simplified Short Approach Lighting System
MUNI.....	Municipal	STAR.....	Saint
N/A.....	Not Applicable	TAAC.....	Sainte
NA.....	Not Authorized	TACAN.....	Standard Terminal Arrival
NAAS.....	Naval Auxiliary Air Station	TCH.....	Terminal Arrival Area
NAF.....	Naval Air Facility	TDZ.....	Tactical Air Navigation
NALF.....	Naval Auxiliary Landing Field	TDZE.....	Threshold Crossing Height
NAS.....	Naval Air Station	TDZ/CL.....	Touchdown Zone
NDB.....	Nondirectional Radio Beacon	TDZL.....	Touchdown Zone Elevation
NM.....	Nautical Mile	THR.....	Touchdown Zone and Runway Centerline Lighting
NOLF.....	Naval Outlying Field	TODA.....	Touchdown Zone Lights
NoPT.....	No Procedure Turn	TORA.....	Threshold
NOTAM.....	Notice to Airmen	tr.....	Takeoff Distance Available
NS.....	Naval Station	TRML.....	Takeoff Run Available
NTL.....	National	TWR.....	Track
ODALS.....	Omnidirectional Approach Lighting System	UNICOM.....	Terminal
ODP.....	Obstacle Departure Procedure	USA.....	Tower
OM.....	Outer Marker	USAF.....	Universal Communications Station

## ABBREVIATIONS 25107

USCG.....	United States Coast Guard
USMC.....	United States Marine Corps
USN.....	United States Navy
USSF.....	United States Space Force
VASI.....	Visual Approach Slope Indicator
VCOA.....	Visual Climb Over Airport
VDA.....	Vertical Descent Angle
VDP.....	Visual Descent Point
VFR.....	Visual Flight Rules
VGSI.....	Visual Glide Slope Indicator
VNAV.....	Vertical Navigation
VOR.....	Very High Frequency Omni-Directional Range
VORTAC.....	Very High Frequency Omni-Directional Range/Tactical Air Navigation
WAAS.....	Wide Area Augmentation System
WP/WPT.....	Waypoint

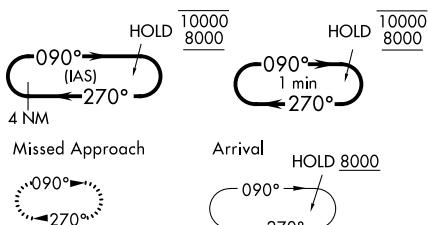
## PLANVIEW SYMBOLS

## ROUTES



## HOLDING PATTERNS

Hold-in-lieu of Procedure Turn



Holding pattern with maximum restricted airspeed: (175K) applies to all altitudes.

(210K) applies to altitudes above 6000' to and including 14000'.

Arrival Holding Pattern altitude restrictions will be indicated when they deviate from the adjacent leg.

Timing or distance limits for Hold-in-lieu of Procedure Turn Holding Patterns will be shown. DME fixes may be shown.

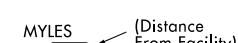
## FIXES/ATC REPORTING REQUIREMENTS

△ Reporting Point

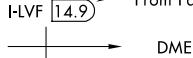


◆ Waypoint

◆ MAP WP (Flyby)



◆ MAP WP (Flyover)



○ Flyover Point

✗ (CFTSP) Computer Navigation Fix (CNF)-No ATC Function ("✗" omitted when it is a MAP)

— R-198 — Radial line and value

— LR-198 — Lead Radial

— LB-198 — Lead Bearing

## ALTITUDES

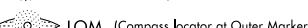
<u>5500</u>	Mandatory Altitude	3000	Recommended Altitude
<u>2500</u>	Minimum Altitude	5000	Mandatory Block
<u>4300</u>	Maximum Altitude	3000	Altitude

## INDICATED AIRSPEED

175K	120K	250K	180K
Mandatory Airspeed	Minimum Airspeed	Maximum Airspeed	Recommended Airspeed

## RADIO AIDS TO NAVIGATION

110.1 Underline indicates No Voice transmitted on this frequency



Marker beacons that are not specifically part of the procedure.



Locализator Front Course (LOC/LDA)

Right side shading- Front course



Locализатор Back Course

Left side shading- Back Course



(shown when installation is offset from its normal position off the end of the runway.)

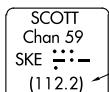
## Primary NAVAID



## Secondary NAVAID



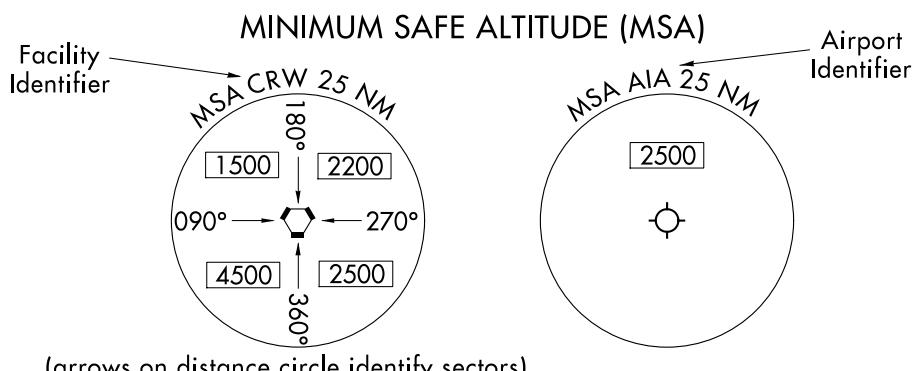
## TACAN or DME NAVAID



VHF

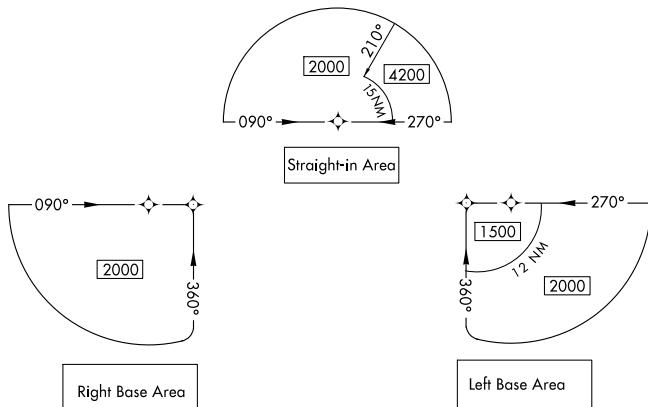
Paired Frequency

## PLANVIEW SYMBOLS



(arrows on distance circle identify sectors)

## TERMINAL ARRIVAL AREA (TAA)



## MISCELLANEOUS

VOR Changeover Point  
 RWY 15 S12° 00.52' End of Rwy Coordinates (DoD only)  
 W77° 06.91'

## SPECIAL USE AIRSPACE



R=Restricted  
 P=Prohibited  
 MOA=Military Operations Area  
 W=Warning  
 A=Alert

~~~~~ Distance not to scale

— — — International Boundary

..... Air Defense Identification Zone

## AIRPORTS



Primary and Secondary (named in planview)  
 Seaplane Base  
 Joint (Civil-Military)

## OBSTACLES

- Spot Elevation
- ▲ Obstacle
- ▲ Highest Obstacle
- Highest Spot Elevation
- ▲▲ Group of Obstacles
- ± Doubtful accuracy

## PROFILE VIEW

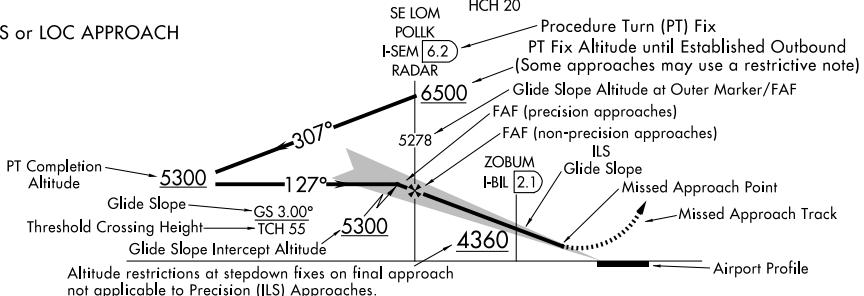
Three different methods are used to depict either electronic or vertical guidance: "GS", "GP", or "VDA".

1. "GS" indicates that an Instrument Landing System (ILS) electronic glide slope (a ground antenna) provides vertical guidance. The profile section of ILS procedures depict a GS angle and TCH in the following format: GS 3.00°  
TCH 55

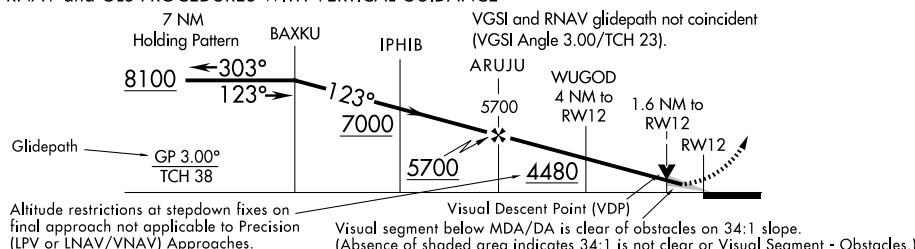
2. "GP" on GLS and RNAV procedures indicates that either electronic vertical guidance (via Wide Area Augmentation System - WAAS or Ground Based Augmentation System - GBAS) or barometric vertical guidance is provided. GLS and RNAV procedures with a published decision altitude (DA/H) depict a GP angle and TCH in the following format: GP 3.00°  
TCH 55

3. An advisory vertical descent angle (VDA) is provided on non-vertically guided conventional procedures and RNAV procedures with only a minimum descent altitude (MDA) to assist in preventing controlled flight into terrain. On Civil (FAA) procedures, this information is placed above or below the procedure track following the fix it is based on. Absence of a VDA or a note that the VDA is not authorized indicates that the prescribed obstacle clearance surface is not clear and the VDA must not be used below MDA. VDA is depicted in the following format:  $\leq 3.00^{\circ}$ . On Copter procedures this is depicted in the following format:  $\leq 7.30^{\circ}$  TCH 55

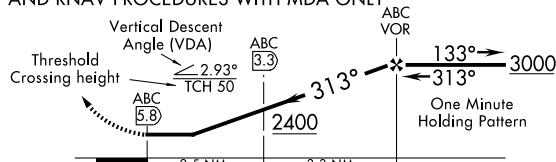
## ILS or LOC APPROACH



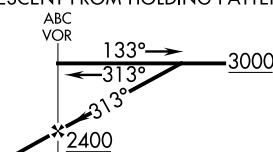
## RNAV and GLS PROCEDURES WITH VERTICAL GUIDANCE



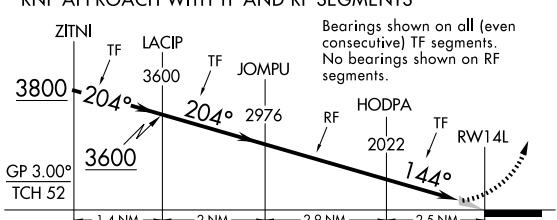
## NON-VERTICALLY GUIDED CONVENTIONAL PROCEDURES AND RNAV PROCEDURES WITH MDA ONLY



## DESCENT FROM HOLDING PATTERN



## RNP APPROACH WITH TF AND RF SEGMENTS



|      |                    |      |                      |
|------|--------------------|------|----------------------|
| 5500 | Mandatory Altitude | 3000 | Recommended Altitude |
| 2500 | Minimum Altitude   | 5000 | Mandatory Block      |
| 4300 | Maximum Altitude   | 3000 | Altitude             |

## PROFILE SYMBOLS

|      |                                                                                                            |
|------|------------------------------------------------------------------------------------------------------------|
| 2400 | Glide Slope/Glidepath Intercept Altitude and final approach fix for vertically guided approach procedures. |
| ▼    | Visual Descent Point (VDP)                                                                                 |
| →    | Visual Flight Path                                                                                         |

Note: Facilities and waypoints are depicted as a solid vertical line while fixes and intersections are depicted as a dashed vertical line.

# LEGEND 23334 STANDARD TERMINAL ARRIVAL (STAR) CHARTS

## RADIO AIDS TO NAVIGATION

### Compulsory:



### Non-Compulsory:



LOM  
(Compass locator  
at outer marker)

Marker Beacon

Localizer Front Course

BACK COURSE

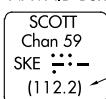
Localizer Back Course  
(Shading on left)

(T) indicates frequency  
protection range



Underline indicates  
no voice transmitted  
on this frequency

TACAN or DME  
NAVAID Box



VHF Paired  
Frequency

(Y) TACAN must be placed  
in "Y" mode to receive  
distance information

## FIXES/ATC REPORTING REQUIREMENTS

→ | Unnamed DME fix

▲ Reporting Point (Compulsory)

△ Reporting Point (Non-Compulsory)

→ Obvious DME  
(DME mileage matches  
route mileage)

75 → DME Mileage  
(when not obvious)

◆ Waypoint  
(Compulsory)

◆ Waypoint  
(Non-Compulsory)

○ Flyover Point

× (CFTSP) Computer Navigation Fix  
(CNF) - No ATC Function

## AIRPORTS

○ Civil ○ Military ○ (Civil-Military)  
Airports not served by the procedure  
shown in screened color

○ Civil ○ Military ○ (Civil-Military)  
Joint

## ROUTES

MAA FL200 Maximum Authorized Altitude  
4500 MEA-Minimum Enroute Altitude  
\*3500 MOCA-Minimum Obstruction Clearance Altitude

270° Arrival Route  
(65) Mileage between Radio Aids, Reporting Points,  
and Route Breaks

→ Transition Route

→ R-275 Radial line and value

→ Lost Communications Track

V12 J80 Airway/Jet Route Identification

(IAS) Holding Pattern

Lost Comm  
Holding Pattern

Holding pattern with maximum restricted airspeed  
(175K) applies to all altitudes  
(210K) applies to altitudes above 6000' to and  
including 14000'

## SPECIAL USE AIRSPACE



R-Restricted

W-Warning

P-Prohibited

A-Alert

MOA-Military Operations Area

## ALTITUDES

5500

Mandatory Altitude  
(Cross at)

2300

Minimum Altitude  
(Cross at or above)

4800

Maximum Altitude  
(Cross at or below)

15000  
12000

Block Altitude

→ Altitude change at other  
than Radio Aids to  
Navigation

## INDICATED AIRSPEED

175K

Mandatory  
Airspeed

120K

Minimum  
Airspeed

250K

Maximum  
Airspeed

## MISCELLANEOUS



Changeover Point

..... Air Defense Identification Zone

N

Indicates  
True North is  
not aligned to  
the top of the  
page

Ldg KLAS and KHND

Ldg Rwy 16L/C/R

Terminus  
Identifier

## RADIO AIDS TO NAVIGATION

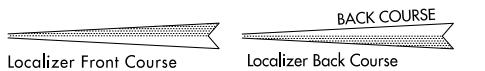
## Compulsory:



## Non-Compulsory:



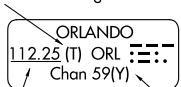
LOC LOC/DME  
(shown when installation is offset from its normal position off the end of the runway.)



Localizer Front Course

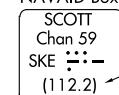
Localizer Back Course (Shading on left)

(T) indicates frequency protection range



Underline indicates no voice transmitted on this frequency

TACAN or DME NAVAID Box



VHF Paired Frequency

(Y) TACAN must be placed in "Y" mode to receive distance information

## FIXES/ATC REPORTING REQUIREMENTS

→ Unnamed DME fix

▲ Reporting Point (Compulsory)

△ Reporting Point (Non-Compulsory)

→ Obvious DME (DME mileage matches route mileage) → DME Mileage (when not obvious)

◆ Waypoint (Compulsory)

◆ Waypoint (Non-Compulsory)

○ Flyover Point

x (CFTSP) Computer Navigation Fix (CNF) - No ATC Function

## MISCELLANEOUS

Changeover Point Distance not to scale

— International Boundary

— Sector Boundary

..... Air Defense Identification Zone

▼ Takeoff Minimums and (Obstacle) Departure Procedures entry published.

## ROUTES

4500 MEA-Minimum Enroute Altitude  
\*3500 MOCA-Minimum Obstruction Clearance Altitude

270° Departure Route  
(65) Mileage between Radio Aids, Reporting Points, and Route Breaks

Transition Route

R-275 Radial line and value

..... Lost Communications Track

Visual Flight Path

V12

J80

Airway/Jet Route Identification

(IAS) Holding Pattern

Lost Comm Holding Pattern  
Holding pattern with maximum restricted airspeed (175K) applies to all altitudes (210K) applies to altitudes above 6000' to and including 14000'

## SPECIAL USE AIRSPACE



R-Restricted

P-Prohibited

MOA-Military Operations Area

W-Warning

A-Alert

A-Alert

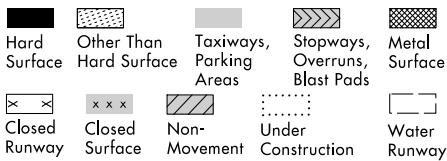
MOA-Military Operations Area

## LEGEND

## INSTRUMENT APPROACH PROCEDURES (CHARTS)

## AIRPORT DIAGRAM/AIRPORT SKETCH

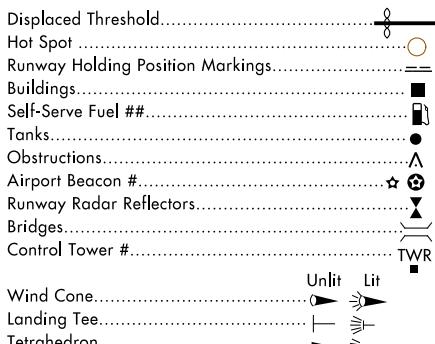
## Runways



**ARRESTING GEAR:** Specific arresting gear systems; e.g., BAK12, MA-1A etc., shown on airport diagrams, not applicable to Civil Pilots. Military Pilots refer to appropriate DOD publications.

uni-directional      bi-directional      Jet Barrier  
ARRESTING SYSTEM (EMAS)

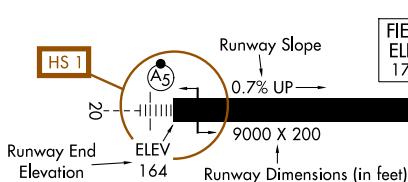
## REFERENCE FEATURES



# When Control Tower and Rotating Beacon are co-located, Beacon symbol will be used and further identified as TWR.

# See appropriate Chart Supplement for information.

Runway Weight Bearing Capacity or Pavement Classification Number (PCN)/Pavement Classification Rating (PCR) is shown as a codified expression. Refer to the appropriate Supplement/Directory for applicable codes e.g., RWY 14-32 PCR 560 R/B/W/T; S-75, D-185, 2D-325, 2D/2D2-1120



Helicopter Alighting Areas (H) (H) (H) (H) (H) (H)  
Negative Symbols used to identify Copter Procedures landing point (H) (H) (H) (H) (H) (H)

NOTE:  
Landmark features depicted on Copter Approach insets and sketches are provided for visual reference only.  
Runway TDZ elevation.....TDZE 123

Runway Slope.....—0.3% Down.....0.8% UP—  
(shown when rounded runway slope is  $\geq 0.3\%$ )

NOTE:  
Runway Slope measured to midpoint on runways 8000 feet or longer.

U.S. Navy Optical Landing System (OLS) "OLS" location is shown because of its height of approximately 7 feet and proximity to edge of runway may create an obstruction for some types of aircraft.

Approach light symbols are shown in the Flight Information Handbook.

Airport diagram scales are variable.

True/magnetic North orientation may vary from diagram to diagram

Coordinate values are shown in 1 or  $\frac{1}{2}$  minute increments. They are further broken down into 6 second ticks, within each 1 minute increments.

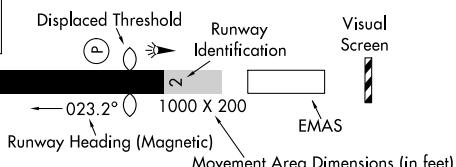
Positional accuracy within  $\pm 600$  feet unless otherwise noted on the chart.

Runway length depicted is the physical length of the runway (end-to-end, including displaced thresholds if any) but excluding areas designated as stopways.

A D symbol is shown to indicate runway declared distance information available, see appropriate Chart Supplement for distance information.

NOTE:  
All new and revised airport diagrams are shown referenced to the World Geodetic System (WGS) (noted on appropriate diagram), and may not be compatible with local coordinates published in DoD FLIP. (Foreign Only)

The airport sketch box includes the final approach course or final approach course extended.



## SCOPE

Airport diagrams are specifically designed to assist in the movement of ground traffic at locations with complex runway/taxiway configurations. Airport diagrams are not intended to be used for approach and landing or departure operations. For revisions to Airport Diagrams: Consult FAA Order 7910.4.

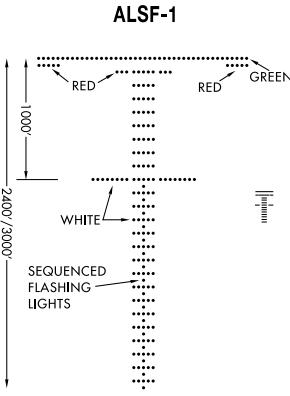
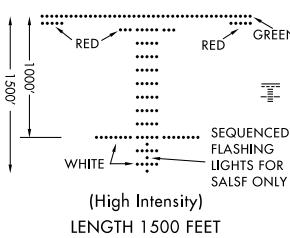
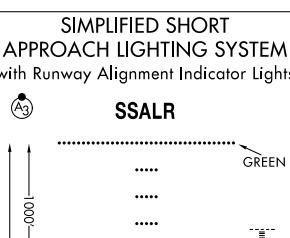
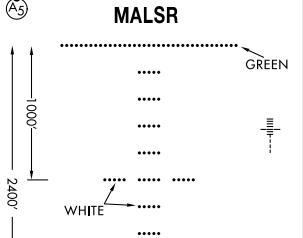
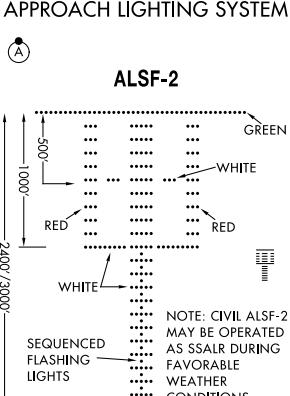
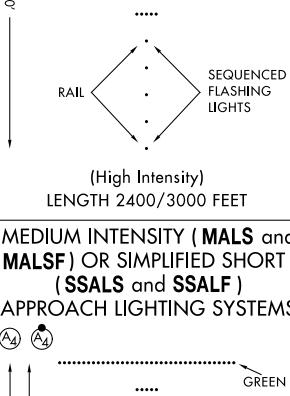
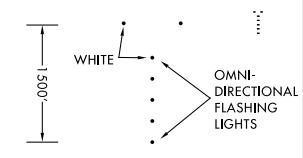
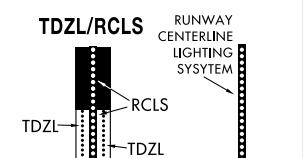
## LEGEND

# LEGEND 25331

## INSTRUMENT APPROACH PROCEDURES (CHARTS) APPROACH LIGHTING SYSTEM - UNITED STATES

Approach lighting and visual glide slope systems are indicated on the airport sketch by an identifier, e.g., (A2), (V), etc.

A dot "•" portrayed with approach lighting letter identifier indicates sequenced flashing lights (F) installed with the approach lighting system e.g., (A1). Negative symbology, e.g., (A1), (V) indicates Pilot Controlled Lighting (PCL).

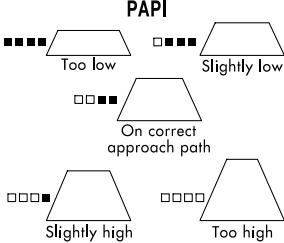
| CATEGORY I<br>APPROACH LIGHTING SYSTEM                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                             | SHORT APPROACH<br>LIGHTING SYSTEM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | MEDIUM INTENSITY<br>APPROACH LIGHTING SYSTEM<br>with Runway Alignment Indicator Lights |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| <p><b>(A1)</b></p> <p><b>ALSF-1</b></p>  <p>SEQUENCED FLASHING LIGHTS</p> <p>1000' 2400'/3000'</p> <p>(High Intensity) LENGTH 2400/3000 FEET</p>                                                                                                                                                                               | <p><b>(A2)</b> <b>(A3)</b></p> <p><b>SALS/SALSF</b></p>  <p>1500'</p> <p>SEQUENCED FLASHING LIGHTS FOR SALSF ONLY</p> <p>(High Intensity) LENGTH 1500 FEET</p> <p><b>SSALR</b></p>  <p>2400'</p> <p>SEQUENCED FLASHING LIGHTS</p> <p>LENGTH 2400 FEET</p> | <p><b>(A5)</b></p> <p><b>MALSR</b></p>  <p>1000'</p> <p>WHITE</p> <p>SEQUENCED FLASHING LIGHTS</p> <p>LENGTH 1500 FEET</p>                                                                                                                                                                                                                                                                                                                                                            |                                                                                        |
| <p><b>CATEGORY II<br/>APPROACH LIGHTING SYSTEM</b></p> <p><b>(A)</b></p> <p><b>ALSF-2</b></p>  <p>500' 1000'</p> <p>SEQUENCED FLASHING LIGHTS</p> <p>2400'/3000'</p> <p>NOTE: CIVIL ALSF-2<br/>MAY BE OPERATED<br/>AS SSALR DURING<br/>FAVORABLE<br/>WEATHER<br/>CONDITIONS</p> <p>(High Intensity) LENGTH 2400/3000 FEET</p> | <p><b>(A4)</b> <b>(A5)</b></p> <p><b>MEDIUM INTENSITY (MALS and MALSF) OR SIMPLIFIED SHORT (SSALS and SSALF) APPROACH LIGHTING SYSTEMS</b></p>  <p>1000'</p> <p>SEQUENCED FLASHING LIGHTS FOR MALSF/SSALF ONLY</p> <p>1400'</p> <p>WHITE</p> <p>SEQUENCED FLASHING LIGHTS</p> <p>LENGTH 1400 FEET</p>                                     | <p><b>ODALS</b></p>  <p>1500'</p> <p>WHITE</p> <p>OMNI-DIRECTIONAL FLASHING LIGHTS</p> <p>LENGTH 1500 FEET</p> <p><b>RUNWAY TOUCHDOWN ZONE LIGHTS AND RUNWAY CENTERLINE LIGHTING SYSTEMS</b></p> <p><b>TDZL/RCLS</b></p>  <p>RUNWAY CENTERLINE LIGHTING SYSTEM</p> <p>TDZL</p> <p>RCLS</p> <p>TDZL</p> <p>AVAILABILITY of TDZL/RCLS will be shown by NOTE in SKETCH, e.g. "TDZL/RCLS Rwy 15".</p> |                                                                                        |

# LEGEND 25331

Approach lighting and visual glide slope systems are indicated on the airport sketch by an identifier, **(P)**, **(V)** etc.

A dot "•" portrayed with approach lighting letter identifier indicates sequenced flashing lights (F) installed with the approach lighting system e.g., **(A)**. Negative symbology, e.g., **(A)**, **(V)** indicates Pilot Controlled Lighting (PCL).

**(P)** PRECISION APPROACH PATH INDICATOR  
**PAPI**

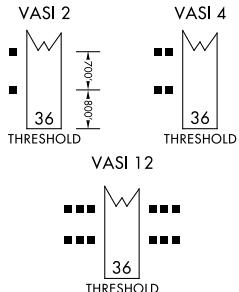


Legend: □ White ■ Red

**(V)** VISUAL APPROACH SLOPE INDICATOR  
**VASI**

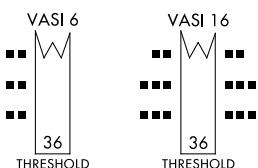
VISUAL APPROACH SLOPE INDICATOR WITH STANDARD THRESHOLD CLEARANCE PROVIDED.

ALL LIGHTS WHITE — TOO HIGH  
FAR LIGHTS RED — ON GLIDE SLOPE  
NEAR LIGHTS WHITE — TOO LOW

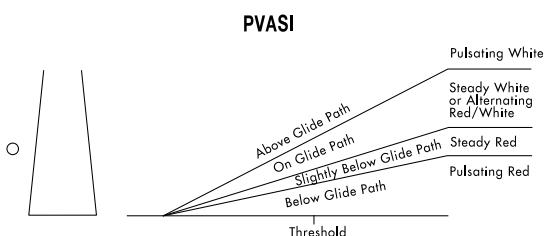


**(V3)** VISUAL APPROACH SLOPE INDICATOR  
**VASI**

3-BAR, 6 OR 16 BOX, VISUAL APPROACH SLOPE INDICATOR THAT PROVIDES 2 GUIDE ANGLES AND 2 THRESHOLD CROSSING HEIGHTS.

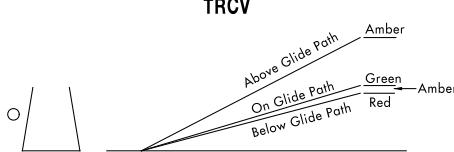


**(V2)** PULSATING VISUAL APPROACH SLOPE INDICATOR  
**PVASI**



CAUTION: When viewing the pulsating visual approach slope indicators in the pulsating white or pulsating red sectors, it is possible to mistake this lighting aid for another aircraft or a ground vehicle. Pilots should exercise caution when using this type of system.

**(V4)** TRI-COLOR VISUAL APPROACH SLOPE INDICATOR  
**TRCV**

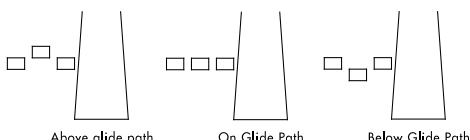


CAUTION: When the aircraft descends from green to red, the pilot may see a dark amber color during the transition from green to red.

**(V5)**

ALIGNMENT OF ELEMENTS SYSTEMS

**APAP**



Painted panels which may be lighted at night.  
To use the system the pilot positions the aircraft so the elements are in alignment.

## FREQUENCY PAIRING TABLE

| TACAN CHANNEL | VHF FREQUENCY | TACAN CHANNEL | VHF FREQUENCY | TACAN CHANNEL | VHF FREQUENCY |
|---------------|---------------|---------------|---------------|---------------|---------------|
| 17Y           | 108.05        | 40X           | 110.30        | 88Y           | 114.15        |
| 18X           | 108.10        | 40Y           | 110.35        | 89Y           | 114.25        |
| 18Y           | 108.15        | 41Y           | 110.45        | 90Y           | 114.35        |
| 19Y           | 108.25        | 42X           | 110.50        | 91Y           | 114.45        |
| 20X           | 108.30        | 42Y           | 110.55        | 92Y           | 114.55        |
| 20Y           | 108.35        | 43Y           | 110.65        | 93Y           | 114.65        |
| 21Y           | 108.45        | 44X           | 110.70        | 94Y           | 114.75        |
| 22X           | 108.50        | 44Y           | 110.75        | 95Y           | 114.85        |
| 22Y           | 108.55        | 45Y           | 110.85        | 96Y           | 114.95        |
| 23Y           | 108.65        | 46X           | 110.90        | 97Y           | 115.05        |
| 24X           | 108.70        | 46Y           | 110.95        | 98Y           | 115.15        |
| 24Y           | 108.75        | 47Y           | 111.05        | 99Y           | 115.25        |
| 25Y           | 108.85        | 48X           | 111.10        | 100Y          | 115.35        |
| 26X           | 108.90        | 48Y           | 111.15        | 101Y          | 115.45        |
| 26Y           | 108.95        | 49Y           | 111.25        | 102Y          | 115.55        |
| 27Y           | 109.05        | 50X           | 111.30        | 103Y          | 115.65        |
| 28X           | 109.10        | 50Y           | 111.35        | 104Y          | 115.75        |
| 28Y           | 109.15        | 51Y           | 111.45        | 105Y          | 115.85        |
| 29Y           | 109.25        | 52X           | 111.50        | 106Y          | 115.95        |
| 30X           | 109.30        | 52Y           | 111.55        | 107Y          | 116.05        |
| 30Y           | 109.35        | 53Y           | 111.65        | 108Y          | 116.15        |
| 31Y           | 109.45        | 54X           | 111.70        | 109Y          | 116.25        |
| 32X           | 109.50        | 54Y           | 111.75        | 110Y          | 116.35        |
| 32Y           | 109.55        | 55Y           | 111.85        | 111Y          | 116.45        |
| 33Y           | 109.65        | 56X           | 111.90        | 112Y          | 116.55        |
| 34X           | 109.70        | 56Y           | 111.95        | 113Y          | 116.65        |
| 34Y           | 109.75        | 80Y           | 113.35        | 114Y          | 116.75        |
| 35Y           | 109.85        | 81Y           | 113.45        | 115Y          | 116.85        |
| 36X           | 109.90        | 82Y           | 113.55        | 116Y          | 116.95        |
| 36Y           | 109.95        | 83Y           | 113.65        | 117Y          | 117.05        |
| 37Y           | 110.05        | 84Y           | 113.75        | 118Y          | 117.15        |
| 38X           | 110.10        | 85Y           | 113.85        | 119Y          | 117.25        |
| 38Y           | 110.15        | 86Y           | 113.95        |               |               |
| 39Y           | 110.25        | 87Y           | 114.05        |               |               |

See the Chart Supplement for a complete listing.

## SUPPLEMENTAL TABLES 25107

INSTRUMENT TAKEOFF AND APPROACH PROCEDURE CHARTS  
RATE OF CLIMB TABLE  
(ft per min)

The rate of climb table is provided for use in planning and executing climbs with a known or approximate ground speed. Rates of climb in ft per min are monitored with a vertical speed indicator (VSI). The use of a climb rate should not be used if it will exceed the aircraft's operational limitations.

| ft/NM | %    | GROUND SPEED (knots) |     |      |      |      |      |      |      |      |      |      |  |
|-------|------|----------------------|-----|------|------|------|------|------|------|------|------|------|--|
|       |      | 60                   | 90  | 120  | 150  | 180  | 210  | 240  | 270  | 300  | 330  | 360  |  |
| 152   | 2.50 | 152                  | 228 | 304  | 380  | 456  | 532  | 608  | 684  | 760  | 836  | 912  |  |
| 200   | 3.29 | 200                  | 300 | 400  | 500  | 600  | 700  | 800  | 900  | 1000 | 1100 | 1200 |  |
| 210   | 3.46 | 210                  | 315 | 420  | 525  | 630  | 735  | 840  | 945  | 1050 | 1155 | 1260 |  |
| 220   | 3.62 | 220                  | 330 | 440  | 550  | 660  | 770  | 880  | 990  | 1100 | 1210 | 1320 |  |
| 230   | 3.79 | 230                  | 345 | 460  | 575  | 690  | 805  | 920  | 1035 | 1150 | 1265 | 1380 |  |
| 240   | 3.95 | 240                  | 360 | 480  | 600  | 720  | 840  | 960  | 1080 | 1200 | 1320 | 1440 |  |
| 250   | 4.11 | 250                  | 375 | 500  | 625  | 750  | 875  | 1000 | 1125 | 1250 | 1375 | 1500 |  |
| 260   | 4.28 | 260                  | 390 | 520  | 650  | 780  | 910  | 1040 | 1170 | 1300 | 1430 | 1560 |  |
| 270   | 4.44 | 270                  | 405 | 540  | 675  | 810  | 945  | 1080 | 1215 | 1350 | 1485 | 1620 |  |
| 280   | 4.61 | 280                  | 420 | 560  | 700  | 840  | 980  | 1120 | 1260 | 1400 | 1540 | 1680 |  |
| 290   | 4.77 | 290                  | 435 | 580  | 725  | 870  | 1015 | 1160 | 1305 | 1450 | 1595 | 1740 |  |
| 300   | 4.94 | 300                  | 450 | 600  | 750  | 900  | 1050 | 1200 | 1350 | 1500 | 1650 | 1800 |  |
| 310   | 5.10 | 310                  | 465 | 620  | 775  | 930  | 1085 | 1240 | 1395 | 1550 | 1705 | 1860 |  |
| 320   | 5.27 | 320                  | 480 | 640  | 800  | 960  | 1120 | 1280 | 1440 | 1600 | 1760 | 1920 |  |
| 330   | 5.43 | 330                  | 495 | 660  | 825  | 990  | 1155 | 1320 | 1485 | 1650 | 1815 | 1980 |  |
| 340   | 5.60 | 340                  | 510 | 680  | 850  | 1020 | 1190 | 1360 | 1530 | 1700 | 1870 | 2040 |  |
| 350   | 5.76 | 350                  | 525 | 700  | 875  | 1050 | 1225 | 1400 | 1575 | 1750 | 1925 | 2100 |  |
| 360   | 5.92 | 360                  | 540 | 720  | 900  | 1080 | 1260 | 1440 | 1620 | 1800 | 1980 | 2160 |  |
| 370   | 6.09 | 370                  | 555 | 740  | 925  | 1110 | 1295 | 1480 | 1665 | 1850 | 2035 | 2220 |  |
| 380   | 6.25 | 380                  | 570 | 760  | 950  | 1140 | 1330 | 1520 | 1710 | 1900 | 2090 | 2280 |  |
| 390   | 6.42 | 390                  | 585 | 780  | 975  | 1170 | 1365 | 1560 | 1755 | 1950 | 2145 | 2340 |  |
| 400   | 6.58 | 400                  | 600 | 800  | 1000 | 1200 | 1400 | 1600 | 1800 | 2000 | 2200 | 2400 |  |
| 450   | 7.41 | 450                  | 675 | 900  | 1125 | 1350 | 1575 | 1800 | 2025 | 2250 | 2475 | 2700 |  |
| 500   | 8.23 | 500                  | 750 | 1000 | 1250 | 1500 | 1750 | 2000 | 2250 | 2500 | 2750 | 3000 |  |
| 550   | 9.05 | 550                  | 825 | 1100 | 1375 | 1650 | 1925 | 2200 | 2475 | 2750 | 3025 | 3300 |  |

## SUPPLEMENTAL TABLES 25107

## SUPPLEMENTAL TABLES 25107

INSTRUMENT TAKEOFF AND APPROACH PROCEDURE CHARTS  
RATE OF DESCENT TABLE  
(ft per min)

The rate of descent table is provided for use in planning and executing descents with a known or approximate ground speed. The descent chart may also be used to calculate a constant rate of descent in the final segment on a non-precision approach. This rate of descent is advisory only. Rates of descent in ft per min are monitored with a vertical speed indicator (VSI). The use of a descent rate should not be used if it will exceed the aircraft's operational limitations.

| ANGLE | ft/NM | GROUND SPEED (knots) |      |      |      |      |      |      |      |      |      |      |
|-------|-------|----------------------|------|------|------|------|------|------|------|------|------|------|
|       |       | 60                   | 90   | 120  | 150  | 180  | 210  | 240  | 270  | 300  | 330  | 360  |
| 2.0   | 212   | 212                  | 318  | 424  | 530  | 637  | 743  | 849  | 955  | 1061 | 1167 | 1273 |
| 2.5   | 265   | 265                  | 398  | 531  | 663  | 796  | 929  | 1061 | 1194 | 1326 | 1459 | 1592 |
| 2.6   | 276   | 276                  | 414  | 552  | 690  | 828  | 966  | 1104 | 1242 | 1380 | 1518 | 1655 |
| 2.7   | 287   | 287                  | 430  | 573  | 716  | 860  | 1003 | 1146 | 1289 | 1433 | 1576 | 1719 |
| 2.8   | 297   | 297                  | 446  | 594  | 743  | 892  | 1040 | 1189 | 1337 | 1486 | 1634 | 1783 |
| 2.9   | 308   | 308                  | 462  | 616  | 770  | 923  | 1077 | 1231 | 1385 | 1539 | 1693 | 1847 |
| 3.0   | 318   | 318                  | 478  | 637  | 796  | 955  | 1115 | 1274 | 1433 | 1592 | 1751 | 1911 |
| 3.1   | 329   | 329                  | 494  | 658  | 823  | 987  | 1152 | 1316 | 1481 | 1645 | 1810 | 1974 |
| 3.2   | 340   | 340                  | 510  | 679  | 849  | 1019 | 1189 | 1359 | 1529 | 1699 | 1868 | 2038 |
| 3.3   | 350   | 350                  | 526  | 701  | 876  | 1051 | 1226 | 1401 | 1577 | 1752 | 1927 | 2102 |
| 3.4   | 361   | 361                  | 541  | 722  | 902  | 1083 | 1263 | 1444 | 1624 | 1805 | 1985 | 2166 |
| 3.5   | 372   | 372                  | 557  | 743  | 929  | 1115 | 1301 | 1487 | 1672 | 1858 | 2044 | 2230 |
| 3.6   | 382   | 382                  | 573  | 765  | 956  | 1147 | 1338 | 1529 | 1720 | 1911 | 2103 | 2294 |
| 3.7   | 393   | 393                  | 589  | 786  | 982  | 1179 | 1375 | 1572 | 1768 | 1965 | 2161 | 2358 |
| 3.8   | 404   | 404                  | 605  | 807  | 1009 | 1211 | 1413 | 1614 | 1816 | 2018 | 2220 | 2421 |
| 3.9   | 414   | 414                  | 621  | 828  | 1036 | 1243 | 1450 | 1657 | 1864 | 2071 | 2278 | 2485 |
| 4.0   | 425   | 425                  | 637  | 850  | 1062 | 1275 | 1487 | 1700 | 1912 | 2124 | 2337 | 2549 |
| 4.5   | 478   | 478                  | 717  | 956  | 1196 | 1435 | 1674 | 1913 | 2152 | 2391 | 2630 | 2869 |
| 5.0   | 532   | 532                  | 797  | 1063 | 1329 | 1595 | 1861 | 2126 | 2392 | 2658 | 2924 | 3190 |
| 5.5   | 585   | 585                  | 878  | 1170 | 1463 | 1755 | 2048 | 2340 | 2633 | 2925 | 3218 | 3510 |
| 6.0   | 639   | 639                  | 958  | 1277 | 1597 | 1916 | 2235 | 2555 | 2874 | 3193 | 3512 | 3832 |
| 6.5   | 692   | 692                  | 1038 | 1385 | 1731 | 2077 | 2423 | 2769 | 3115 | 3461 | 3808 | 4154 |
| 7.0   | 746   | 746                  | 1119 | 1492 | 1865 | 2238 | 2611 | 2984 | 3357 | 3730 | 4103 | 4476 |
| 7.5   | 800   | 800                  | 1200 | 1600 | 2000 | 2400 | 2800 | 3200 | 3600 | 4000 | 4400 | 4800 |
| 8.0   | 854   | 854                  | 1281 | 1708 | 2135 | 2562 | 2989 | 3416 | 3843 | 4270 | 4697 | 5124 |
| 8.5   | 908   | 908                  | 1362 | 1816 | 2270 | 2724 | 3178 | 3632 | 4086 | 4540 | 4994 | 5448 |
| 9.0   | 962   | 962                  | 1444 | 1925 | 2406 | 2887 | 3368 | 3849 | 4331 | 4812 | 5293 | 5774 |
| 9.5   | 1017  | 1017                 | 1525 | 2034 | 2542 | 3050 | 3559 | 4067 | 4576 | 5084 | 5592 | 6101 |
| 10.0  | 1071  | 1071                 | 1607 | 2143 | 2678 | 3214 | 3750 | 4286 | 4821 | 5357 | 5893 | 6428 |

## SUPPLEMENTAL TABLES 25107